DISPOSABLE TISSUE AND PRODUCTION APPARATUS THEREOF

Technical field

The present invention relates to a disposable tissue and a production apparatus thereof, and more particularly, to a disposable tissue compressed into a predetermined shape that can be conveniently carried and hygienically used, and an apparatus for producing the disposable tissue.

Background Art

A disposable tissue is a disposable article that can be scrapped after use in wiping surfaces of various objects or a human skin. The disposable tissue is made of nonwoven, pulp or the like, and is classified into a dry tissue and a wet tissue according to whether moisture is contained therein.

Generally, since the disposable tissue has a propensity to suffer damages such as tear or crease, the disposable tissue has been sold in a state where it is packed in a soft sack or a case with a predetermined shape, which can be easily opened. Further, the disposable tissue is packed in a state where it is folded into two or three folds such that it can be easily taken out from the opened sack or case in use. Moreover, it is desirable to pack the disposable tissue in a possible smallest size so that a user can easily store and carry it when the user is on journey or is out.

Particularly, in case of a wet tissue, the wet tissue is packed in a sealed container so that moisture contained in the packed wet tissue does not evaporate. Further, the tissue is wetted with water to which antimicrobial is added, and then stored in a cool and dark place to prevent microbes from propagating during the distribution of the wet tissue. In addition, the conventional wet tissue should be packed and distributed by the piece so as to prevent the tissue from drying.

As described above, since the conventional wet tissue should be stored and distributed while being packed by the piece in a separate sack or case to prevent the evaporation of moisture, the volume of the product becomes large, resulting in increases of packing and distribution costs.

Further, since the conventional wet tissue contains antimicrobial as well as water, the wet tissue may cause ill effects on the skin in a case where a child or person with weak skin uses the conventional wet tissue, and the sickening smell of the antimicrobial contained in the wet tissue causes unpleasantness in use. Moreover, in a case where the wet tissue will be stored for a long time, microbes such as colon bacilli are propagated in moisture. Thus, there is a risk of microbial infection.

Disclosure of Invention

The present invention is conceived to resolve the aforementioned problems. An object of the invention is to provide a novel disposable tissue that can be conveniently stored and carried without packing it by the peace due to its minimum volume obtained through compression molding and can be then used as a wet tissue due to restoration to its origin shape upon supply of water thereto in use.

Another object of the present invention is to provide a disposal tissue that is stored and carried in a dry state in which microbes cannot be propagated, and does not require addition of harmful substances such as antimicrobial used for preventing microbial propagation.

A further object of the present invention is to provide a novel disposable tissue that can be packed and stored at low cost due to its rigid compressed state with certain strength.

A still further object of the present invention is to provide an apparatus for producing the disposable tissue described above.

A disposable tissue according to the present invention for achieving the objects is made of non-woven of rayon material, and received and compression-molded in a mold having a predetermined shape.

If the non-woven fabric of rayon material is pressed under a pressure higher than a predetermined value, the non-woven is compression-molded into a mass having a predetermined shape and maintains its shape. If moisture is added to the disposable tissue molded described above, the disposable tissue is restored to its original shape.

In the disposable tissue according to the present invention, a compressibility ($\Delta V/V$) of the molded disposable tissue may range from 0.4 to 0.6.

If the disposable tissue is compression-molded at an excessive high compressibility, restoration of the tissue is not performed well. On the contrary, if the disposable tissue is compression-molded at a low compressibility, the disposable tissue cannot maintain the molded shape and thus the shape of the disposable tissue is deformed during distribution and storage. Consequently, the compressibility within the above range is appropriate.

In the disposable tissue according to the present invention, the disposable tissue may be compression-molded by being pressed longitudinally in a state where the disposable tissue is rolled.

The molded tissue having a rolled shape absorbs moisture to be restored smoothly to its original shape and a user spreads and conveniently utilizes the wet tissue in use.

In the disposable tissue according to the present invention, the molded disposable tissue may take the shape of a cylinder.

The cylindrically molded tissue can be not only restored well to its original state, but also facilitate manufacture of the mold and a work for inserting the disposal tissue into the mold.

An apparatus for producing a disposable tissue according to the present invention comprises a cylindrical molding bushing having a longitudinal, through passage; a table for supporting the molding bushing such that both end portions of the through passage of the molding bushing are exposed to the outside; an upper press installed vertically movably above the table and having a pressing rod to be inserted into the through passage of the molding bushing when the upper press moves downwardly; and a lower press installed vertically movably below the table and having a supporting rod to be inserted into the through passage of the molding bushing when the lower press moves upwardly.

The upper press comprises a power source for pressing the disposable tissue received in the through passage. The supporting rod of the lower press closes an entrance of the through passage of the molding bushing to compression-mold the disposable tissue and opens the entrance of the through passage to discharge the molded the disposable tissue from the through passage. The disposable tissue is molded to have a shape that is the same as a space defined by the through passage of the molding bushing, the supporting

rod of the lower press and the pressing rod of the upper press. In a state where the entrance of the through passage of the molding bushing is opened, the molded disposable tissue is discharged from the through passage by the upper press moving downwardly.

In the apparatus for producing the disposable tissue according to the present invention, the through passage of the molding bushing may have an upwardly flared, tapered surface at an inner surface of an upper entrance thereof.

In the apparatus for producing the disposable tissue according to the present invention, the molding bushing may have a step formed on an outer circumferential surface thereof to have a larger diameter section and a smaller diameter section, the molding bushing may be inserted into a through hole formed on the table, and the through hole formed on the table may have a diameter smaller than that of the larger diameter section but larger than that of the smaller diameter section of the molding bushing so that the step of the molding bushing is caught and movably supported by a perimeter of the through hole.

In the apparatus for producing the disposable tissue according to the present invention, a plurality of molding bushings may be provided, each of the molding bushings may have a step formed on an outer circumference surface thereof to have a larger diameter section and a smaller diameter section, the apparatus may further comprise a supporting block supported on the table, the supporting block may take the shape of a cylinder and have a plurality of through passages for receiving and supporting the molding bushings with the steps formed thereon, each of the molding bushings may be received in the relevant one of the through passages formed in the supporting block, each of the through passages may have a diameter smaller than that of the larger diameter section but larger than that of the smaller diameter section of the relevant one of the molding bushings so that the step of each of the molding bushings is caught and movably supported by a perimeter of each through passage of the supporting block, the upper press may have a plurality of pressing rods provided above the relevant molding bushings, and the lower press may have a plurality of supporting rods provided below the relevant molding bushings.

In the apparatus for producing the disposable tissue according to the present

invention, the supporting block may have a step formed on an outer circumferential surface thereof to have a larger diameter section and a smaller diameter section, the supporting block may be inserted into a through hole formed on the table, and the through passage may have a diameter smaller than that of the larger diameter section but larger than that of the smaller diameter section of the molding bushing so that the step of the molding bushing is caught and movably supported by a perimeter of the through passage.

Further, in the apparatus for producing the disposable tissue according to the present invention, the pressing rod may have an end surface on which rugged portions are formed for stamping a definite embossed pattern on the disposable tissue to be compression-molded.

Patterns or symbols are engraved on the compression-molded disposable tissue by the rugged portion.

Brief Description of Drawings

Fig. 1 is a perspective view of a disposable tissue according to an embodiment of the present invention.

Fig. 2 is a sectional view of an apparatus for producing a disposal tissue according to an embodiment of the present invention.

Fig. 3 is a sectional view showing a state before the apparatus for producing the disposal tissue according to the embodiment of the present invention performs a compression operation.

Fig. 4 is a sectional view showing a state where the disposable tissue according the embodiment of the present invention is pressed by the apparatus.

Figs. 5 and 6 are conceptual views showing a state where the disposable tissue according to the embodiment of the present invention is restored to its original state when the tissue is submerged in a liquid.

<Explanation of reference numerals for designating main components in the drawings>

1: Disposable tissue 10: Apparatus for producing a disposal tissue

11: Molding bushing 11a: Through passage

13: Lower press 15: Upper press

Best Mode for Carrying out the Invention

Hereinafter, a disposable tissue and an apparatus for producing the same according to the present invention will be described in detail with reference to the accompanying drawings.

Fig. 1 is a perspective view showing a state where a disposable tissue 1 according to an embodiment of the present invention is made through compression molding, Fig. 2 is a sectional view of an apparatus for producing a disposal tissue according to an embodiment of the present invention, Fig. 3 is a sectional view showing a state before the apparatus for producing the disposal tissue according to the embodiment of the present invention performs a compression operation, and Fig. 4 is a sectional view showing a state where the disposable tissue according the present invention is pressed by the apparatus.

A disposable tissue 1 of the present invention is made of non-woven of rayon material. In particular, since the disposable tissue 1 of the present invention has superior flexibility and breathability, it is preferred that the disposable tissue be made of non-woven manufactured by means of a spun lace method in which a web is formed out of viscose rayon and fibers are coupled using a high-pressure water stream. The disposable tissue 1 of the present invention is received and compressed in a mold having a predetermined shape to form a mass having a shape corresponding to that of the mold. This molded shape of the mass is maintained until moisture is supplied thereto.

Since the disposable tissue 1 of the present invention is made of the nonwoven of rayon material, the disposable tissue has resilience similarly to conventional fibers. The resilience represents the ability of a fiber to be restored to its original state when an external force is not exerted thereon after it has been bent or compressed due to application of an external force thereto. This resilience may be referred to as compression elasticity or a work elastic restoration modulus. The resilience of a fiber is closely involved with the elasticity of the fiber and varies according to the form or sectional shape of the fiber. Accordingly, the disposable tissue 1 of the present invention should be pressed under a

pressure higher than a predetermined value to prevent the tissue from restoring to its origin shape even though the pressure is relieved after the compression molding thereof. Meanwhile, once a pressure higher than a predetermined value is applied to the disposable tissue 1 of the present invention, the disposable tissue 1 is hardly restored to its original state even though the tissue has absorbed moisture and been swelled. Accordingly, in order to make the non-woven of rayon material be restored to its original state when it absorbs moisture, the disposable tissue 1 of the present invention should be pressed under a pressure less than a predetermined value. That is, the disposable tissue 1 of the present invention should be subjected to compression molding under a pressure within a predetermined pressure range that varies according to the shape or configuration of the non-woven as described above. However, if the disposable tissue 1 is pressed under a pressure within the predetermined pressure range, it is compressed at a compressibility ($\Delta V/V$) in a range of 0.4 to 0.6. Here, the compressibility ($\Delta V/V$) represents a ratio of the amount of volume change (ΔV) in the compressed disposable tissue to the volume (V) of the uncompressed disposable tissue 1. The amount of volume change (ΔV) means a difference between the volume (V) of the uncompressed disposable tissue 1 and the volume of the compression-molded disposable tissue.

Further, even though the disposable tissue 1 of the present invention taking any shape is put in a mold, the disposable tissue 1 is molded into a shape corresponding to that of the mold. The molded tissue is restored to its original shape when moisture is added thereto as described below. However, in a case where the disposable tissue 1 of the present invention has been randomly crumpled or folded into many folds, is received in the mold and then subjected to compression molding, the crumpled or folded portions of the tissue are not smoothly restored. Accordingly, it is preferred that the disposable tissue 1 of the present invention be compression molded by being pressed in a longitudinal direction in a state where the tissue has been rolled, (see Figs. 5 and 6).

Meanwhile, the disposable tissue 1 of the present invention may be molded to take various shapes such as a sphere, a prism or a cylinder. In the disposable tissue 1 of the present invention, however, plastic deformation may be produced at a portion where there is a rapid change in shape. The aforementioned portion where there is a rapid change in

shape mainly corresponds to an edge portion of such a prism. Accordingly, it is preferred that the disposable tissue 1 of the present invention be molded to take a shape of a sphere in which there is no corner. Further, it is preferred that the tissue be molded to take the shape of a cylinder which has relatively fewer edges than a prism. Meanwhile, as will be described below, the disposable tissue 1 of the present invention is inserted into a molding bushing shown in Fig. 2 and then molded to have a shape corresponding to that of the molding bushing. However, since it is difficult to manufacture a molding bushing taking the shape of a sphere and to insert the disposable tissue into such a spherical molding bushing, it is preferred that the molding bushing takes the shape of a column. Therefore, it is desirable to produce the disposable tissue 1 of the present invention by molding it through insertion thereof into a cylindrical molding bushing which has not only relatively fewer edge portions but also is easily manufactured and operated. That is, it is preferred that the disposable tissue 1 of the present invention be molded to take the shape of a cylinder.

The disposable tissue 1 of the present invention is compression-molded in a state where it is received in a predetermined cylindrical mold as described above. Hereinafter, an apparatus 10 for producing the disposable tissue according to an embodiment of the present invention by compression-molding non-woven of rayon material will be described in detail.

Referring to Fig. 2, the apparatus 10 for producing the disposable tissue according to the embodiment of the present invention comprises a molding unit 17, a lower press 13 and an upper press 15.

The molding unit 17 comprises a table 16, molding bushings 11 for receiving disposable tissues to be molded, and a supporting block 12 for supporting the molding bushings 11 on the table 16. The table 16 has a through hole 16' into which the supporting block 12 is fitted. An outer surface of the supporting block 12 is defined by a larger diameter section 12c and a smaller diameter section 12d extending from the larger diameter section 12c. Through holes 12a are formed longitudinally at a peripheral portion of the supporting block 12. When the supporting block 12 is inserted into the through hole 16' of the table 16, a step 12b formed at a boundary between the larger diameter

section 12c and the smaller diameter section 12d is caught and supported by an upper perimeter of the through hole 16' of the table 16. The supporting block 12 is formed such that the diameter of the larger diameter section 12c of the supporting block 12 is larger than that of the through hole 16' of the table 16 and the diameter of the smaller diameter section 12d of the supporting block 12 is smaller than that of the through hole 16' of the table 16. Accordingly, in a state where the supporting block 12 is supported by the table 16, a clearance 14 is created between the through hole 16' of the table 16 and the smaller diameter section 12d of the supporting block 12 so that the supporting block 12 can be horizontally played on the table 16. An outer surface of the molding bushing 11 is defined by a larger diameter section 11e and a smaller diameter section 11f extending from the larger diameter section 11e. A through passage 11a is formed longitudinally at the center of each molding bushing 11. When the molding bushing 11 is inserted into the through hole 12a of the supporting block 12, a step 11d formed at a boundary between the larger diameter section 11e and the smaller diameter section 11f is caught and supported by an upper perimeter of the through passage 12a of the supporting block 12. The molding bushing 11 is formed such that the diameter of the larger diameter section 11e of the molding bushing 11 is larger than that of the through hole 12a of the supporting block 12 and the diameter of the smaller diameter section 11f of the molding bushing 11 is smaller than that of the through hole 12a of the supporting block 12. Accordingly, in a state where the molding bushing 11 is supported by the supporting block 12, a clearance 18 is created between the through hole 12a of the supporting block 12 and the smaller diameter section 11f of the molding bushing 11 so that the molding bushing 11 can be horizontally played in the supporting block 12. The through passage 11a of the molding bushing 11 has an upwardly flared, tapered surface 11b formed at an inner surface of an upper portion thereof so that a pressing rod 15' of the upper press 15 can be smoothly inserted into the through passage 11a. On the contrary, the through passage 11a of the molding bushing 11 has a downwardly flared, tapered surface 11c formed at an inner surface of a lower portion thereof so that a supporting rod 13' of the lower press 13 can be smoothly inserted into the through passage 11a.

The lower press 13 comprises the supporting rods 13' for opening and closing

lower entrances of the through passages 11a of the respective molding bushings 11. The lower press 13 moves toward the through passages 11a of the molding bushings 11 and then the supporting rods 13' are inserted into the respective through passages 11a so that the lower entrances of through passages 11a of the molding bushings 11 are closed by the supporting rods 13'.

The upper press 15 comprises the pressing rods 15' that are inserted into the through passages 11a of the molding bushings 11 via upper entrances thereof and move downward to press the disposable tissues 1 received in the through passages 11a. The upper press 15 is provided to vertically reciprocate above the molding bushings 11. That is, the upper press 15 is installed such that the pressing rods 15' of the upper press 15 can be inserted into the through passages 11a of the molding bushings 11 to press the disposable tissues 1 received in the through passages 11a of the molding bushings 11 and the upper press 15 can be returned to above the upper entrances of the through passages 11a. The upper press 15 moves downward by power transmitted from a power source (not shown) so that the pressing rods 15 move downward and press the disposable tissues 1 received in the through passages 11a. After the pressing is completed, the upper press 15 pushes downwardly the compression-molded disposable tissues 1. Further, the upper press 15 moves upward to be removed from the through passages 11a in order to insert new disposable tissues into the through passages via the upper entrances.

Meanwhile, in the apparatus 10 for producing the disposable tissue according to the present invention, an end surface of each pressing rod 15' is formed with rugged portions (not shown) for stamping a predetermined embossed pattern on the compression-molded disposable tissue 1.

Further, although the apparatus 10 for producing the disposable tissue according to the present invention has been described by way of example as having the plate-shaped table 16 on which the molding bushings 11 and the supporting block 12 are installed, continuous works may be performed by forming the table 16 in the shape of a rotational disk or installing molding bushings 11 on a conveyor device or the like.

Moreover, although this embodiment has been described by way of example as having a structure in which the supporting block 12 and 12' is made separately from the

table 16, the present invention is not limited thereto. It will be readily apparent that the supporting block 12 and may be formed integrally with the table 16. Furthermore, it will be readily apparent that the molding bushings 11 may be directly inserted into and supported by in the table 16.

The apparatus 10 for producing the disposable tissue having the structure described above is operated as follows.

In a state where the disposable tissue 1 that has been rolled as shown in Fig. 3 is inserted into the through passage 11a of the molding bushing 11, the lower press 13 moves toward the through passages 11a of the molding bushings 11 and the supporting rods 13' of the lower press 13 are inserted into lower portions of the through passages 11a. At this time, since the clearance 14 which allows the supporting block 12 to play horizontally is formed between the supporting block 12 and the through hole 16' of the table 16 and there is the clearance 18 between the supporting block 12 and each molding bushing 11, even though the center of each through passage 11a of the molding bushing 11 is not aligned with the center of each supporting rod 13' and thus there is an offset between the two centers, the supporting block 12 plays horizontally and thus the supporting rods 13' are inserted smoothly into the lower portions of the through passages 11a of the molding bushings 11 when the supporting rods 13' are inserted into the lower portions of the through passages 11a of the molding bushings 11.

Moreover, since each through passage 11a has the downwardly flared, tapered surface 11c formed at the inner surface of the lower portion thereof, the supporting rod 13' is slid on the tapered surface 11c and inserted more smoothly into the through passage 11a.

Next, each pressing rod 15' of the upper press 15 is inserted into the relevant through passage 11a of the molding bushing 11 via the upper entrance thereof and moves downward to press the disposable tissue 1 as shown in Fig. 4. At this time, even though each supporting rod 13' of the lower press 13 has been inserted into the lower portion of the through passage 11a of the molding bushing 11, the center of the pressing rod 15' is not aligned with the center of the through passage 11a of the molding bushing 11 because of a mechanical clearance existing between the supporting rod 13' and the through passage 11a. Further, even though the center of the pressing rod 15' is not aligned with the center of the

through passage 11a and thus an offset exists between the two centers, when the pressing rod 15' of the upper press 15 is inserted into the through passage 11a of the molding bushing 11, the supporting block 12 and the molding bushing 11 play horizontally so that the pressing rod 15' is slid on the tapered surface 11b formed on the inner surface of the upper portion of the through passage 11a of the molding bushing 11 and inserted smoothly into the through passage 11a.

As described above, when the pressing rod 15' is inserted into the through passage 11a of the molding bushing 11 to press the disposable tissue 1 received in the through passage 11a, the disposable tissue 1 is molded into a specific shape defined by the molding bushing 11, the supporting rod 13' of the lower press 13 and the pressing rod 15' of the upper press 15.

Next, the supporting rod 13' of the lower press 13 closing the lower entrance of the through passage 13a of the molding bushing 11 is removed therefrom and the pressing rod 15 moves further downward. Thus, the molded disposable tissue 1 is discharged from the through passage 11a of the molding bushing 11.

The disposable tissue 1 molded as described above is restored to an original state when moisture is applied thereto. Figs. 5 and 6 are conceptual views showing a state where the disposable tissue 1 of the present invention is submerged in a liquid 3 such as water and then restored to the original state.

Generally, when a fiber absorbs moisture, the fiber is swelled. Accordingly, a crumpled or folded portion of the fiber receives a swelling force generated by the absorption of the moisture. Thus, the fiber is restored to its original shape. The disposable tissue 1 of the present invention utilizes the property of the fiber by which the fiber is restored to its original shape through the absorption of the moisture. Referring to the figures, once the molded disposable tissue 1 is submerged in the liquid such as water as shown in Fig. 5, the molded tissue absorbs the liquid and is restored to its original shape in which the tissue it is rolled as shown in Fig. 6. The user can utilize the disposable tissue that has been restored as described above.

Industrial Applicability

Since the disposable tissue of the present invention constructed as above is compression-molded into a mass that maintains a predetermined shape, the present invention has advantages in that there is no need to prepare an additional soft sack or case for storing and carrying the disposable tissue as well as there is no need to seal the sack or case in which a wet tissue is accommodated.

Further, since the disposable tissue of the present invention is stored and carried in a dry state, the present invention has advantages in that microbes does not propagate and thus there is no need to add harmful substances such as antimicrobial used for preventing the propagation of the microbes.

In addition, the disposable tissue of the present invention has an advantage in that since the tissue is compressed at a compressibility larger than a certain value and has small volume, it is easy to store and carry the disposable tissue.

Furthermore, since the disposable tissue is compression-molded into a mass with a predetermined shape, it is easy to pack the tissue and production costs are decreased.

Further, the apparatus for producing the disposable tissue according to the present invention can produce the disposable tissue according to the present invention at low production costs.

Moreover, the apparatus for producing the disposable tissue according to the present invention has an advantage in that a character, symbols or the like can be easily stamped on an outer surface of the disposable tissue according to the present invention.

It is intended that the embodiments of the present invention described above and illustrated in the drawings should not be construed as limiting the technical spirit of the present invention. The scope of the present invention is defined only by the appended claims. Those skilled in the art can make various changes and modifications thereto without departing from its true spirit. Therefore, various changes and modifications obvious to those skilled in the art will fall within the scope of the present invention.